Lower Duwamish Waterway
Slip 4 Early Action Area

WORK PLAN FOR INVESTIGATION TASKS

FINAL
October 16, 2003

Submitted to:
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, WA 98101

Submitted by:
City of Seattle
King County

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLP	Contract Laboratory Program
DQO	data quality objective
Ecology	Washington Department of Ecology
EE/CA	Engineering evaluation and cost analysis
EPA	U.S. Environmental Protection Agency
FSP	field sampling plan
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
RI	remedial investigation
SAP	sampling and analysis plan

I. INTRODUCTION

This work plan describes activities related to the initiation of early actions for the cleanup of Slip 4 at the Lower Duwamish Waterway (LDW) Superfund Site in Seattle Washington. The LDW was placed on the National Priorities List on September 13, 2001 in response to elevated concentrations of chemicals in sediments and some fish tissues. Slip 4 was identified as a candidate early action site (Windward 2003) during the first phase of the LDW remedial investigation.

The work plan was prepared based on the requirements in the May 2, 2003 letter from the U.S. Environmental Protection Agency (EPA) to the Lower Duwamish Work Group (LDWG). The LDWG is comprised of the City of Seattle, Port of Seattle, King County and The Boeing Company. Slip 4 early actions described in this work plan will be performed by the City of Seattle and King County pursuant to Tasks 9 and 10 of the Statement of Work for the LDW Administrative Order on Consent.

The purposes of the activities described in this work plan are to implement tasks to characterize sediment quality in the Slip 4 Early Action Area (Figure 1), evaluate potential sources to the slip, and support EPA's associated public involvement activities. Potential preparation of an engineering evaluation and cost analysis (EE/CA) for the cleanup of the Slip 4 Early Action Area, and the cleanup action itself, will be handled separately.

The following tasks associated with the Slip 4 Early Action Area are described in this work plan:

1. Preparation of a report summarizing existing information and a sampling and analysis plan (SAP), including a field sampling plan (FSP), quality assurance project plan (QAPP), and health and safety plan (HSP).
2. Preparation of a cruise and data report (including data validation report).
3. Preparation of a technical memorandum that identifies the proposed boundary of the removal action in the Slip 4 Early Action Area.

The remainder of this work plan contains a description of the tasks to be undertaken, the contents of the required documents, and the project schedule. Qualifications of the contractors performing the work and resumes of key personnel are contained in Appendices A and B, respectively.

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Slip 4 Early Action Area
Lower - Duwamish Waterway
Superfund Site

Figure 1

II. WORK TO BE PERFORMED

TASK 1 - SUMMARY OF EXISTING INFORMATION AND IDENTIFICATION OF DATA GAPS REPORT AND SAMPLING AND ANALYSIS PLANS

Summary of Existing Information and Identification of Data Gaps Report

A Summary of Existing Information and Identification of Data Gaps Report will be prepared, which will include, at a minimum, the following information:

- Introduction/Purpose
- Brief description of Slip 4 Early Action Area characteristics, including ecological and physical characteristics
- Identification of property owners and other operators in the Slip 4 Early Action Area, and owners and operators of all immediately adjacent upland property
- Description of the nature and extent of contamination, to the extent it can be determined, within the vicinity of the Slip 4 Early Action Area, including a summary of existing sediment data with a comparison to Washington State Sediment Management Standards (Sediment Quality Standards and Cleanup Screening Levels)
- Discussion of known and potential contaminants of concern
- Summary of available existing information on all environmental investigations and cleanups on adjoining properties
- Summary of potential ongoing and historical sources of contamination to the Slip 4 Early Action Area to the extent they can be determined, and, for each source, a description of the types of information that would support the EPA/Washington State Department of Ecology (Ecology) Baseline Source Control Matrix for the Lower Duwamish Waterway Superfund Site
- Other information (including maps and figures), as necessary, to gain a general understanding of the Slip 4 Early Action Area.

Data gaps will be identified through use of EPA's (2000) data quality objectives (DQO) process. DQOs that address site characterization and the potential for recontamination will be developed and data gaps identified. The data gaps will be filled by the collection and analysis of field data. Investigation activities will focus on defining the site boundary, resulting in data of adequate technical content to evaluate potential ecological and human health risks and support development of an analysis of alternatives in a possible future EE/CA.

The City and County will submit to EPA a complete list of previous studies or sampling efforts conducted independently, or under state, local, or other federal authorities or agreements, that may assist in describing site history and land use, in defining the nature and extent of sediment contamination, and in identifying possible sources of recontamination in the Slip 4 Early Action Area. Upon request by EPA, copies of documents will be submitted to EPA.

Additionally, the City and County will continue to work with Ecology and EPA on source control efforts related to the Slip 4 Early Action Area, which may include identifying sources; prioritizing, documenting, and tracking of source control plans and completed source control actions; evaluating and documenting effectiveness of source control measures; and providing input to EPA and Ecology's decision regarding whether source control is adequate to move forward with the early action. Generally, significant continuing sources should be controlled to the greatest extent possible before or concurrent with cleanup of sediment.

Sampling and Analysis Plans

The procedures for conducting all field activities will be detailed in a SAP to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that data meet data quality objectives. The SAP will provide a mechanism for planning field activities and consists of a FSP and a QAPP (additional details are provided in Section III of this SOW). The contents of the SAP will incorporate the type of information described in EPA's (1988) Guidance for Conducting Remedial Investigation and Feasibility Studies under CERCLA (e.g., see Appendix B of the Guidance). A health and safety plan that is designed to protect onsite personnel and area residents from physical, chemical, and other hazards posed by field sampling efforts will be submitted with the SAP.

TASK 2 - CRUISE AND DATA REPORT

A cruise and data report that includes all information regarding the field sampling event, including validated analytical results, will be submitted following receipt of validated data. The cruise and data report will include, at a minimum, the following sections:

- Introduction/Purpose.
- Summary of field sampling effort, including information on sampling vessel, dates of field effort, summary of sample collection effort (e.g., surface sediment, subsurface sediment), field sample observations (e.g., sediment descriptions), summary of sample and station locations including station depths (corrected to mean lower low water), station locations (latitudes/longitudes and state plane

coordinates), maps, and figures. Station locations will be provided electronically with the data.

- Deviations from the FSP.
- Summary of sample handling and shipment.
- Summary of all data.

A separate data validation report will be prepared for each field effort. It will be transmitted to EPA within 5 working days of receipt from the independent data validator. Respondents will provide EPA with information necessary (i.e., raw data) for EPA to perform an independent review of the validated data upon request. All sediment data will also be submitted electronically to EPA in SEDQUAL format.

TASK 3 - TECHNICAL MEMORANDUM ON PROPOSED BOUNDARIES OF THE REMOVAL ACTION

A draft technical memorandum on proposed boundaries of the removal action will be submitted to EPA following preparation of the data report. All available data will be considered for the development of an appropriate boundary for the removal action, and the technical memorandum will provide a rationale for the proposed boundary. Data interpretation will be consistent with the spatial analysis approaches agreed upon by EPA for the overall LDW site.

COMMUNITY INVOLVEMENT

The City and County will follow the EPA's communication and coordination strategy (Keeley 2003) and send electronic and hard copies of all draft and final deliverables to Karen Keeley (EPA) and Kymberly Takasaki (U.S. Army Corps of Engineers). At the same time, the City and County will also send electronic draft and final deliverables of Tasks 1 and 3, and final deliverables for Task 2, to the following EPA staff and external stakeholders: Lon Kissinger, EPA; Erika Hoffman, EPA; Bruce Duncan, EPA; Allison Hiltner, EPA; Cindy Schuster, EPA; Rick Huey, Ecology; B.J. Cummings, Duwamish River Cleanup Coalition; Glen St. Amant, Muckleshoot Tribe; Alison O'Sullivan, Suquamish Tribe; Craig Thompson, Ecology, State Trustee; Randy Carman, Washington Department of Fish and Wildlife; Marla Steinhoff, NOAA; Jeff Krausmann, U.S. Fish and Wildlife Service; and Greg Wingard, Waste Action Project. Hard copies of draft and final deliverables, or figures and photos from these documents, will be mailed to stakeholders upon request by EPA.

III. CONTENT OF SUPPORTING PLANS

SAMPLING AND ANALYSIS PLAN

The SAP will be project-specific and will be comprised of a project-specific FSP and project-specific QAPP for sample analysis and data handling for any samples collected from the Slip 4 Early Action Area. The SAP will be based upon EPA guidance. As appropriate, the SAP will ensure that sample collection and analytical activities are conducted in accordance with the Puget Sound Estuary Program protocols. Sediment sampling will also be conducted in a manner that is consistent with sampling being performed by the RI team for the LDW Superfund Site so that the resulting data can also be used by the LDW RI team during the Phase 2 RI and risk assessment for the LDW.

The FSP will detail the sampling and data-gathering methods that will be used during the project. It will include sampling objectives, a detailed description of sampling activities, sample locations, sample analyses, sampling equipment and procedures, sampling schedule, station positioning, and sample handling procedures (e.g., sample containers and labels, sample preservation). It may include surface and subsurface sediment chemical and biological sampling, source sampling, a geophysical survey (including consideration of precision bathymetric survey, subbottom profiling, and/or side scan sonar), example field forms, and standard operating procedures.

The QAPP will describe the quality assurance and quality control protocols necessary to achieve required DQOs. The QAPP will be prepared in accordance with EPA Requirements for Quality Assurance Project Plans (QA/R-5) (EPA 2001c) and EPA Guidance on Quality Assurance Project Plans (QA/G-5) (EPA 2001a). The QAPP will address sampling procedures; sample custody; analytical procedures; and data reduction, validation, reporting; and personnel qualifications.

The laboratory performing the work must follow an approved quality assurance (QA) program that complies with EPA Requirements for Quality Management Plans (QA/R-2) (EPA 2001b), or equivalent documentation as determined by EPA. If a laboratory not in the EPA Contract Laboratory Program (CLP) is selected, the QAPP will be consistent with the requirements of the CLP for laboratories proposed outside the CLP. Upon request, EPA may have access to laboratory personnel, equipment, and records for sample collection, transportation, and analysis, and may conduct a performance audit.

All sampling and analyses will conform to EPA direction, approval, and guidance regarding sampling, quality assurance/quality control (QA/QC), data validation, and chain-of-custody procedures.

Upon request by EPA, City of Seattle/King County will analyze samples submitted by EPA for QA monitoring and will allow EPA or its authorized representatives to take split and/or duplicate samples. City of Seattle/King County will notify EPA not less than 14

days in advance of any sample collection activity, unless shorter notice is agreed to by EPA. EPA will have the right to take any additional samples that EPA deems necessary. Upon request, EPA will allow City of Seattle/King County to take split or duplicate samples of any samples it takes as part of its oversight of City of Seattle/King County's implementation of the work.

HEALTH AND SAFETY PLAN

The HSP ensures protection of the public health and safety during performance of onsite Work. This plan will be prepared in accordance with EPA's (1992) Standard Operating Safety Guide. In addition, the plan will comply with all currently applicable Occupational Safety and Health Administration regulations found at 29 CFR 1910. Respondents will implement the plan during the duration of the work described in the work plan.

IV. SUMMARY OF MAJOR DELIVERABLES/SCHEDULE

The schedule for submission of deliverables described herein is presented in Table 1.

TABLE 1. Project Schedule [1]

Task 1	A.1 Draft Summary of Existing Information Report and Identification of Data Gaps A.2 Final Summary of Existing Information Report and Identification of Data Gaps	A.1 Within 35 working days of EPA approval of the work plan. A.2 Within 15 working days after receipt of written EPA comments on the draft report.
	A.1 Draft Sampling and Analysis Plan A.2 Final Sampling and Analysis Plan	A.1 Within 25 working days of receipt of EPA comments on the draft Summary of Existing Information and Identification of Data Gaps report A.2 Within 15 working days of receipt of written EPA comments on the draft SAP
Task 2	Field Sampling	Within 10 working days of EPA approval of the SAP. NOTE: Intertidal sampling will occur during daylight low tides, which are available March – October. Consequently, intertidal sampling may be decoupled from subtidal sampling.
	Chemical Data Validation Report: Subtidal Data Chemical Data Validation report: Intertidal Data	Within 5 working days after receipt of the validation report from the independent validator Within 5 working days after receipt of the validation report from the independent validator
	A.1 Draft Cruise and Data Report A.2 Final Cruise and Data Report	A.1 Within 25 working days after receipt of final validated chemistry package A.2 Within 20 working days after receipt of EPA comments on draft report.
Task 3	A.1 Draft Technical Memorandum on Proposed Boundaries of the Removal Action A.2 Revised Draft Technical Memorandum on Proposed Boundaries of the Removal Action	A.1 Within 10 working days after EPA approval of final Cruise and Data Report to EPA. A.2 Within 40 working days after receipt of EPA comments on draft memorandum.

[1] EPA will endeavor to provide comments on draft reports no more than 15 working days after receipt and provide approvals of final documents no more than 10 working days after receipt.

V. PROJECT TEAM AND RESPONSIBILITIES

The Slip 4 Early Action Area Investigation will be performed by a different consulting team than is conducting the LDW RI. The team, including their designated lead personnel and general areas of responsibility for the Slip 4 Early Action Area project, includes:

Striplin Environmental Associates (SEA): Site investigation, source evaluation

- Betsy Striplin – Project Manager
- Vicki Fagerness – Deputy Project Manager
- Gary Pascoe – Risk Assessor

Parsons Brinckerhoff (PB): Integration of data needs for an analysis of alternatives

- Jerry Ramsden – Engineer

VI. REFERENCES

EPA. 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. Interim Final, (OWSER Directive 9355.3-01). EPA 540 G-89 004. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC.

EPA. 1992. Standard Operating Safety Guide. PB92-963414. U.S. Environmental Protection Agency, Washington, DC.

EPA. 2000. Guidance for the Data Quality Objectives Process (QA/G-4). EPA/600/R-96/055. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

EPA. 2001a. EPA Guidance for Quality Assurance Project Plans (QA/G-5). EPA/240/R-02/009. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC.

EPA. 2001b. EPA Requirements for Quality Management Plans (QA/R-2). EPA/240/B-01-002. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

EPA. 2001c. EPA Requirements for Quality Assurance Project Plans (QA/R-5). EPA/240/B-01/003. U.S. Environmental Protection Agency, Office of Environmental Information, Washington DC.

Keeley, K. 2003. Personal communication (email of January 30, 2003 to B. Striplin regarding EPA's communication and coordination strategy). U.S. Environmental Protection Agency, Region 10, Seattle, WA.

Windward. 2003. Lower Duwamish Waterway Remedial Investigation, Task 5: Identification of Candidate Sites for Early Action, Technical Memorandum: Data Analysis and Candidate Site Identification. Prepared for the Lower Duwamish Waterway Group. Windward Environmental, 200 West Mercer Street, Seattle, WA.

APPENDIX A

STATEMENT OF QUALIFICATIONS

STRIPLIN ENVIRONMENTAL ASSOCIATES, INC.

STATEMENT OF QUALIFICATIONS

INTRODUCTION

Striplin Environmental Associates (SEA) provides environmental services relating to marine and freshwater sediment and water quality. Since our inception in 1991, we have built a strong reputation for outstanding technical work among our private and regulated agency clients. With a focus on contaminated sediment and dredged material management, our staff work routinely with the following regulatory programs:

- CERCLA
- Clean Water Act
- Puget Sound Dredged Material Disposal Analysis (PSDDA) Program
- Washington State Sediment Management Standards.

Because over 95 percent of our work is in support of private industry and regulated agencies, we have the experience to work proactively on behalf of our regulated clients in their interactions with state and federal regulatory agencies. Our support includes:

- Sediment cleanup
- Disposal site monitoring
- Environmental assessment
- Dredged material evaluation
- Sediment profile imaging

SEDIMENT CLEANUP (RI/FS, RD/RA)

Timely, cost-effective, and environmentally sound solutions are the objectives of SEA contaminated sediment remediation projects. SEA biologists, geologists, and scientists assess sediment quality and integrate chemical and biological criteria with site-specific issues to identify cleanup action areas and develop preliminary remedial designs. Years of experience with both federal (CERCLA) and state cleanup programs allow SEA to provide strategic planning guidance and recommendations to clients conducting sediment cleanup projects.

PROJECT EXAMPLES

Lead Remedial Investigation Consultant for Lower Willamette PRP group, Portland, OR
SEA is coordinating the remedial investigation at the Portland Harbor CERCLA site. Our staff coordinated development of the project work plan with input from four other consulting firms, prepared sampling and analysis plans, and led extensive sampling

efforts in 2002. We conducted extensive reviews of DEQ files on shoreline facilities to evaluate potential historic and ongoing sources.

Technical Support for Seattle City Light Remediation Projects, Seattle, WA
SEA is Seattle City Light's technical consultant on the Lower Duwamish Work Group (LDWG). Responsibilities include meeting attendance, document review, and participation in negotiations with U.S. EPA and the Washington Department of Ecology.

Hylebos Waterway Pre-Remedial Design Study, Tacoma, WA
Chemical and biological analysis of sediments to establish cleanup areas and volumes under CERCLA.

Sitcum Waterway Remedial Action: Water Quality Monitoring, Tacoma, WA
SEA supported the water quality monitoring program for a year-long sediment remedial action program. SEA participated in preparation of the Sampling and Analysis Plan by providing detailed support in areas of field logistics, field methods, and program overview, and provided field support during the ambient monitoring program. During construction, SEA assisted in field activities, data management, QA/QC, and report preparation.

Sediment Characterization and Remediation Plan for Denny Way/Lake Union CSO Control Project, Seattle, WA
Remedial Investigation of sediment quality to establish cleanup areas and volumes used to develop a Remedial Plan.

Remedial Investigation/Risk Assessment at a former Pope and Talbot Wood Treating Site, St. Helens, WA
Remedial Investigation of sediment quality at a former log treatment facility on the Columbia River.

DISPOSAL SITE MONITORING

SEA staff have led and participated in dredged material disposal site monitoring studies throughout the United States. SEA is currently the disposal site monitoring contractor for the WA Department of Natural Resources, the agency responsible for managing the dredged material disposal sites in Puget Sound (PSDDA). SEA has mapped physical, chemical, and biological conditions of the PSDDA sites and other sites along the west coast as described below.

PROJECT EXAMPLES

PSDDA Dredged Material Disposal Site Monitoring, Puget Sound, WA
Mapped the distribution of dredged material and evaluated chemical and biological conditions at unconfined, open-water dredged material disposal site throughout Puget Sound for the WA Department of Natural Resources.

Cominco Mine Offload Facility, Cominco, AK
Evaluated potential dredged material disposal sites in the vicinity of a proposed dredge channel at the Red Dog Mine.

Coos Bay ODMDS Site Monitoring, Coos Bay, OR
Sediment-Profile Imaging (SPI) and video data were used to ground truth the distribution of dredged material predicted with numerical models.

Long Beach Borrow Area Cap Monitoring, Los Angeles, CA
Performed a post-disposal SPI survey to map the distribution of 135,000 m^3 of capping material in confined dredged material disposal site.

Hong Kong Dredged Material Disposal Site Monitoring
Reference sites, dredged material disposal sites and borrow areas were evaluated with SPI at eight sites in Hong Kong Territorial waters.

Eagle Harbor Monitoring, Bainbridge Island, WA
Performed Year 5 Monitoring of the Eagle Harbor Sediment Cap involving physical, chemical, and biological analyses.

ENVIRONMENTAL ASSESSMENT

Projects ranging from dredged material disposal to dock construction and shoreline development all require some type of environmental impact assessment. SEA biologists use existing information or conduct field surveys to evaluate marine habitat and species according to requirements of the Clean Water Act, Endangered Species Act, and NEPA/SEPA. SEA's studies range from site-specific habitat and species surveys to comprehensive environmental impact statements (EIS). SEA also assists with regulatory permit preparation and agency coordination.

PROJECT EXAMPLES

MUDS Programmatic EIS, Puget Sound, WA
Under contract to the US Army Corps of Engineers (Seattle District), SEA prepared a Programmatic EIS to evaluate the development of Multi-User Disposal Sites for contaminated sediments throughout Puget Sound.

Priority Species Survey, U.S. Coast Guard Boatbasin, Ilwaco, WA
Field reconnaissance survey conducted at the U.S. Coast Guard Station, Cape Disappointment (Ilawaco, WA) to identify threatened and endangered marine species and priority marine habitats in the vicinity of the Coast Guard docking facility.

Kimberly-Clark Section 404 Permit Support, Everett, WA
Compilation of existing information on habitat and biological resources, evaluation of potential impacts, coordination with regulatory agencies to identify concerns and potential mitigation requirements, and preparation of the JARPA permit application for bulkhead fill project.

Crab Trawls, Grays Harbor, WA
Documented spatial and temporal variations in Dungeness crab density, size frequency, sex ratio, and shell condition within Grays Harbor, and analyzed data collected between June 1996 and November 1999 for the U.S. Army Corps of Engineers.

DREDGED MATERIAL EVALUATION

SEA has helped several Federal, port, and private clients evaluate materials for potential physical, chemical, or biological impacts resulting from dredged material disposal. Projects have included new-work construction, Federal O&M programs, and others regulated by the Corps of Engineers. SEA has experience with both small and large projects, clean and contaminated sediments, and we have evaluated materials with respect to an array of management alternatives (i.e., nearshore or upland confined disposal facilities, open-water disposal, and beneficial uses).

PROJECT EXAMPLES

East Waterway Bioaccumulation Testing, Seattle, WA
Within one month of Notice To Proceed, SEA successfully initiated and completed a large (28 composite samples) sediment core sampling program that involved two weeks of on-water vibracore sampling and concurrent core sample processing in a temporarily-established shoreside laboratory. Following completion of the field effort, SEA tracked all chemical and biological laboratory efforts. Within one month of receiving the laboratory data packages, SEA conducted QA review of all testing data, and prepared and submitted a complete data report to the client.

U.S. Army Corps of Engineers Sediment Characterizations, Washington State
Performed the field work, coordinated with participating labs, validated the data using QA1 guidelines, and reported the data for projects under a task order contract with the U.S. Army Corps of Engineers, Seattle District, including:

- *Grays Harbor*

- *Squalicum Creek Waterway*
- *Tokeland Marina in Willapa Bay*
- *Port Townsend Marina Entrance Channel*
- *Duwamish Waterway and Turning Basin*
- *South Aberdeen Reach, Grays Harbor*
- *Olympia Harbor*
- *Snohomish River Channel and Settling Basin*
- *Blair Waterway PSDDA Characterization*

U.S. Oil & Refining Co. PSDDA Sediment Characterization, Tacoma, WA
Sediment chemical characterization of high-ranked sediment at an oil transfer dock.

Port of Bellingham
Approximately 10,000 cubic yards of high-ranked material were chemically characterized in Whatcom Creek Waterway to deepen the berth at the Whatcom International Shipping Terminal. PSDDA guidelines were followed to identify suitable dredged material disposal option(s).

SEDIMENT PROFILE IMAGING

Sediment profile imaging (SPI) involves obtaining pictures of the top 20 cm of the seafloor, in vertical profile - an optical core sample. SPI data analysis determines in-situ seafloor properties including: sediment type, biological features, seafloor disturbances, stratigraphy and presence of anthropogenic impacts. SEA offers this service with an in-house SPI camera and analysis software and scientists with over 18 years of SPI experience. SEA staff have conducted numerous SPI surveys throughout the U.S. for projects ranging from dredged material disposal monitoring to mapping the distribution of wood products on the seafloor.

PROJECT EXAMPLES

Hylebos Waterway Pre-Remedial Design Study, Tacoma, WA
SPI study to better understand the influence of physical disturbance on the sedimentary environment with particular reference to benthic infauna evaluations.

Commencement Bay PSDDA Site Monitoring, Tacoma, WA
Mapped the distribution of dredged material disposed at the Puget Sound Dredge Disposal Analysis (PSDDA) unconfined, open-water dredged material disposal site in Commencement Bay.

Cominco Mine Offload Facility, Cominco, AK
Evaluated potential dredged material disposal sites in the vicinity of a proposed dredge channel at the Red Dog Mine.

Coos Bay ODMDS Site Monitoring, Coos Bay, OR
SPI and video data were used to ground truth the distribution of dredged material predicted with numerical models.

Long Beach Borrow Area Cap Monitoring, Los Angeles, CA
Performed post-disposal survey to map the distribution of 135,000 m3 of capping material.

Cascade General Shipyard (Portland Shipyard), Portland, OR
Evaluated sandblast grit distribution and biological ecosystem health surrounding the former Portland Shipyard.

Baxter/Port Quendall Environmental Assessment, Renton, WA
Evaluated surface and subsurface sediments at former wood treating, log processing and log storage facility for possible cleanup and redevelopment.

Hong Kong Dredged Material Disposal Site Monitoring
Reference sites, dredged material disposal sites and borrow areas were evaluated at eight sites in Hong Kong Territorial waters.

Alaska Pulp Company, Sitka, AK
Assisted in surface sediment collections and performed a sediment profile imaging surv ey at the Alaska Pulp Corporation Mill Site and adjacent offshore areas, including Sawmill Cove, Herring Cove and surrounding bays and channels.

Eagle Harbor Monitoring, Bainbridge Island, WA
Performed Year 5 Monitoring of the Eagle Harbor Sediment Cap involving physical, chemical, and biological analyses.

KEY PERSONNEL

BETSY STRIPLIN

Ms. Betsy Striplin is a senior scientist at Striplin Environmental Associates. With over 20 years of experience, Ms. Striplin focuses on strategic planning at contaminated sediment cleanup sites and RI/FS oversight. She consulted with the Port of Portland regarding the potential listing of Portland Harbor as a CERCLA site. On behalf of the Port of Portland, she was a member of Oregon Department of Environmental Quality's work groups to develop a Portland Harbor Sediment Management Plan and an RI/FS Work Plan. Ms. Striplin also works with the City of Seattle relative to the Duwamish River CERCLA program. Ms. Striplin led the sediment assessment activities on the Hylebos Waterway CERCLA site (Tacoma, WA) from 1993-1998, and provided input to a variety of other contaminated sediment and dredged material characterization projects in Puget Sound. Prior to founding Striplin Environmental Associates in 1991, Ms. Striplin managed the Washington Department of Natural Resources' dredging program.

GENE REVELAS

Gene Revelas, a senior marine scientist at SEA, has 18 years experience in the collection, analysis, and interpretation of biological, chemical, and physical sediment data with emphasis on sediment characterization, marine environmental assessment, and aquatic disposal site monitoring. He is expert in the use of sediment-profile photography for benthic habitat quality assessment and seafloor mapping and has experience in several regional dredged material management programs (e.g., DAMOS (New England), PSDDA, Grays Harbor, San Francisco LTMS). From 1991 to 1994, Gene managed the PSDDA program for the Washington Department of Natural Resources. For a nine month period during this tenure at the Department of Natural Resources, Gene managed that agency's contaminated sediments section.

KEITH PINE

Keith Pine joined SEA in January 2003 as a senior project manager with over 18 years of professional experience. He is a registered Professional Geologist in Washington and Oregon. For the past 15 years he has managed and provided oversight of sediment, soil, and groundwater investigations and cleanups at dozens of hazardous waste sites including CERCLA sites, RCRA sites, leaking UST sites, brownfields sites, and for property transfers. Mr. Pine has managed multimedia RI/FSs and RCRA Facility Investigations at several large facilities in the Pacific Northwest including Boeing's Plant 2 along the Lower Duwamish River, Frontier Hard Chrome (Vancouver, WA), and Northwest Pipe and Casing (Clackamas, OR). Through these investigations he has developed specialized expertise in fate and transport processes in tidally affected groundwater environments and groundwater-sediment interactions. As a contractor to U.S. EPA he performed technical oversight of PRP-lead RI/FSs and RDs at several NPL

sites including Commencement Bay, Tulalip Landfill (Marysville, WA), and the GenCorp Aerojet groundwater site (Sacramento, CA). He has managed and participated in sediment investigations involving wood treating chemicals in Elliot Bay, mining wastes in the upper Columbia River and Sanpoil River, pulp mill wastes in the lower Columbia River, smelter wastes in Commencement Bay, and PCBs in the Duwamish River.

SANDY BROWNING

Sandy Browning, a marine scientist with SEA, has 17 years experience in the collection, analysis, and interpretation of physical, chemical, and biological data in relation to marine and freshwater sediments. The majority of her work has centered around the application of federal (CERCLA, CWA), Washington State (SMS) and regional (PSDDA, Grays Harbor) regulations for sediment quality assessment, dredged material characterizations, post-disposal monitoring, and cleanup. She has also lent her database management and GIS mapping expertise to many sediment quality studies. Since 1998, she has managed SEA's participation in the Superfund pre-remedial design studies in Hylebos Waterway (Commencement Bay). Prior to her relocation to Washington, she was involved with the Disposal Area Monitoring System (DAMOS) program, a multi-disciplined approach to determine environmental baseline conditions and impact assessment of dredged material disposal throughout New England waters.

VICKI FAGERNESS

Vicki Fagerness, senior marine scientist, has 14 years experience in the collection, analysis, and interpretation of chemical and biological data associated with marine and freshwater sediment and water quality investigations. She has managed or supported projects ranging from sediment quality characterizations at dredging and hazardous waste sites to sediment monitoring at wastewater outfalls. She has also compiled and analyzed data to identify potential chemical sources and pathways to the marine environment. Her surface water experience includes remedial investigations, landfill monitoring, environmental impact statements and monitoring plan design.

IAN STUPAKOFF

Mr. Stupakoff joined SEA in August 2001 as a senior aquatic scientist following a three-year period as a chemistry, biology, and environmental sciences professor at The Evergreen State College, Olympia, WA and Hobart and William Smith Colleges, Geneva, NY. Before that, Mr. Stupakoff was involved for six years in research of heavy metal and radioactive waste uptake by benthic organisms from contaminated marine sediments. He has also been involved in modeling of geochemical cycling of trace metals by phytoplankton/zooplankton communities in coastal and open ocean waters. He is experienced in the full range of sediment sampling, trace metal clean sampling, radioisotope laboratory analyses, and evaluation techniques. In 2002, Ian led the

comprehensive tissue sample program in the Lower Willamette River as part of the Portland Harbor RI/FS and risk assessment.

PAM SPARKS

Prior to joining SEA in October 2001, Ms. Pamela Sparks worked in the Sediments Management Unit at the Washington Department of Ecology. She has over ten years of experience in program design and the collection, analysis, and interpretation of biological data with an emphasis on marine benthos. Her experience includes coordination of biological testing and evaluation issues, quantitative benthic studies, toxicological evaluations, and risk and biological assessments. She is a co-author of the Washington Administrative Code for the Sediment Management Standards, Chapter 173-204 and an expert in the regional procedures for managing contaminated sediments and helped prepare a draft biological assessment (BA) to support the adoption of regulatory biological and chemical standards of sediment impact zones, recovery zones, and cleanup zones for the SMA. She currently manages the SEA's PSDDA Disposal Site monitoring contract with the Washington DNR and oversees SEA's database operations, which includes EQuIS, SEDQUAL, PSAMP, and NOAA Query Manager formats.

TOM SCHULZ

Tom Schulz, a marine biologist at SEA, has extensive experience in many aspects of field data collection, especially biological/ecological surveys. He has been field project lead for many sediment collection surveys involving coring and grab sampling, including recent Dredged Material Management Program (DMMP) projects in Bellingham, WA (Squalicum Creek) and Grays Harbor, WA. He is also field project lead for Sediment Profile Imaging (SPI) and video surveys and has worked on projects in Norfolk, VA, Eagle Harbor, WA (Wyckoff Superfund Site sediment cap), and Commencement Bay, WA (PSDDA open-water disposal site). Tom is also proficient at preparing large data sets graphically (graphs, charts, and GIS mapping) and in concise tables for statistical and spatial analysis and interpretation, including statistical analyses of bioassay data for comparison to criteria.

PARSONS BRINCKERHOFF

Statement of Qualifications

Firm Profile

Parsons Brinckerhoff (PB) is one of the world's oldest continuously operating engineering firms, having been engaged in engineering and related activities since the founding of an engineering and architectural partnership by William Barclay Parsons in 1885. Headquartered in New York City, PB offers a wide range of engineering, environmental, planning, architectural, and program and construction management services to public and private clients worldwide.

Operating from over 250 corporate and project offices worldwide, PB's more than 9,000 professionals are engaged in the engineering, design, and construction of transportation projects including ports and marine facilities, highways, and rail systems. Our professionals also design and construct buildings, power facilities, and telecommunications systems, as well as provide e-business and management consulting services. Our depth and geographic diversity allow us to mobilize our resources to provide clients with efficient services whenever and wherever they are needed.

Our success has been attributed to many factors—our commitment to quality, our reputation for technical excellence, the respect of our peers, and most important of all, our attitude toward our clients. For over a century, we have anticipated and adapted to changing market realities, working with clients to bring infrastructure development to locations around the globe.

PB Ports & Marine, Inc.

Since the early 1900s, when our founder William Barclay Parsons advised the Isthmian Canal Commission on the building of the Panama Canal, PB has planned, designed, and managed construction of ports, waterways, and marine facilities around the world. Today, we rely on our proven expertise in all modes of transportation to provide innovative solutions for the marine and intermodal infrastructure of tomorrow.

In April 2002, PB formed a separate company, PB Ports & Marine, Inc., to best serve our clients worldwide by creating a fully integrated planning and design team that can respond quickly and efficiently to address any of our clients' needs. PB Ports & Marine, Inc. ensures that the most qualified professionals are assigned to a project – irrespective of the project's location. PB Ports & Marine, Inc., based in PB's many offices nationwide and supported by hundreds of professionals worldwide, is positioned to provide clients with experts in ports, waterway, and marine engineering. PB offers "one-stop" shopping for the most complex port and marine projects.

PB has the resources and experience to provide a full range of services for ports and marine facilities. PB's experience includes development of intermodal transportation and port master plans, design of port terminals and other port facilities, dredging, beneficial use of dredge material, design of confined disposal facilities and artificial islands, dredge material decontamination, environmental permitting, marine borer protection, river and coastal engineering, tariff studies, and port management and operations analyses.

The types of facilities we have provided services for include:

- Deep sea and inland ports
- Container terminals
- General cargo terminals
- Dry bulk terminals
- Liquid bulk terminals
- Roll-on/roll-off (ro-ro) terminals
- Cruise ship terminals
- Shipyards
- Ferry terminals

Dredging and Disposal Services

Over the years the need to expand port and marine facilities and environmental concerns have given dredging and dredged material disposal projects added importance.

PB is proud to be able to offer our clients a full toolbox of potential solutions for navigational and remediation related dredging and disposal projects.

Our services include:

Dredge Plans

- Dredge quantity calculations
- Hydraulic and mechanical equipment selection
- Cost estimates
- Project layout plans
- Disposal option evaluation
- Upland, nearshore, and aquatic disposal site design
- Plans and specifications

- Beneficial use design, including habitat restoration, levee rehabilitation, landfill cover, and mine restoration

Contaminated Sediment Remediation
- Decontamination
- Solidification/stabilization
- Aquatic capping plans

Coastal Engineering and Hydraulic Modeling

Environmental/Permitting
- Sampling and analysis plans
- Monitoring Plans
- Environmental impact statements and assessments

PB has consistently maintained a leadership position in the application of new technologies to find solutions to today's dredging, disposal, and related environmental challenges. Our pioneering efforts include:
- The Central Artery/Tunnel Project – Fort Point Channel: The first project ever to use solidification/stabilization of dredged sediments.
- The Brooklyn Navy Yard Nearshore Confined Disposal Facility Project: Currently in progress, this project involves the dredging and disposal of 160,000 cubic yards of contaminated sediments and will be the first of its kind to be designed and permitted in New York State.
- The Fort McHenry Confined Disposal Facility Project: Dredging and beneficial use of 3.5 million cubic yards of sediments that included 600,000 cubic yards of highly contaminated sediments.
- Development of a Guidance Document for Processing and Beneficial Use of Dredged Material as Fill for the Port Authority of New York and New Jersey.
- Organizing and leading a workshop on the beneficial uses of red clay for the Port Authority of New York and New Jersey.
- Organizing and leading a workshop to reduce sedimentation and dredging for the Port Authority of New York and New Jersey.

Advanced Analytical Capabilities

PB offers expert in-house dredge and disposal engineering services, eliminating the need to use "contractor panels" to help owners develop and contractors comply with complex dredging specifications. PB developed and continually refines a suite of computer programs to assist in dredging design and construction work. These programs include:
- **Pipeline Production Program**, used for project evaluation, dredge plan development, and for providing confidential services to contractors for confirming bid assumptions. The program helps verify equipment selection and can be used during construction to help owners and contractors modify equipment selections when unexpected conditions or equipment performance factors are encountered.
- **SLURRY**, a finite difference computer program predicts the consolidation behavior of slurried and dredged materials under self-weight stresses and large strain during filling and settling areas and in the subsequent quiescent consolidation period. SLURRY is flexible and allows the user to specify a variable filling rate, dredged material properties, and any user specified functions of effective stress. The program uses conventional consolidation theory and implicitly accounts for large strains by means of numerical methods, which reduces execution time and cost. The program is endorsed by Florida Department of Environmental Protection as the program of choice for sizing phosphatic clay and sand-clay mix disposal areas.

Industry Involvement

PB employees continue to advance the state-of-the-art in the field of dredging. PB professionals continue to expand and share their extensive technical knowledge with the engineering community through their membership in professional associations, service on technical committees, participation in seminars, and publishing of technical papers. Our published papers include:

"Evaluation of Water Quality Impacts Related to the Construction of a Nearshore Confined Disposal Facility," by Andrea Rosenthal. Presented at ASCE Dredging 2002, May 2002.

"Contaminated Sediment CDF's: Three Case Histories," by Vahan Tanal. Presented at the Conference on Remediation of Contaminated Sediments, October 2001, Venice, Italy.

"*Lake Panasoffkee Dredging and Restoration*," by Mohamed Alawi, Ph.D. Published at the Florida Lake Management Society Annual Conference, Tallahassee, Florida, May 2001.

"*Lake Griffin Access Dredging and Restoration*," by Mohamed Alawi, Ph.D. Published at the Florida Lake Management Society Annual Conference, Tallahassee, Florida, May 2001.

"Criteria for Beneficial Upland Use of Dredge Material in New York, New Jersey, and Connecticut – A Comparative Discussion," by Andrea Rosenthal, Vahan Tanal, and Rob Damigella. Presented at the ASCE Ports 2001 Conference in Norfolk, Virginia, April – May 2001.

"Clatskanie Pays Penalty; Unable to Carry out Mitigation Project," by Cynthia Lowe. Published in *International Dredging Review*, June/July 2000.

"The Clatskanie River: One Community's Experiences with Dredging," by Cynthia Lowe. Published in *International Dredging Review*, January 1999.

"Lime Stabilization and Disposal of Contaminated Dredge Harbor Sediments," by Vahan Tanal, et al. Published at GEOENVIRONMENT 2000, an ASCE Geotechnical Division Specialty Conference, New Orleans, February 1995.

"Effect of Lime Admixtures on Contaminated Dredged Sediments," by Vahan Tanal, Joe Wang, et al. Published at First International Congress on Environmental Geotechnics, Edmonton, Alberta, July 1994.

"Permit Application Processing," by Margaret Johnson. Published in *International Dredging Review*, August, 1994.

"Vancouver Lake Dredging for Beneficial Uses," by Margaret Johnson. Presented at The Regional Workshop on the Beneficial Uses of Dredged Material in the Western U.S., San Diego, 1989.

"Dredge Spoil Disposal Predictions and Performance: A Case History," by Vahan Tanal. Presented at the ASCE Symposium for Sedimentation Consolidation Models, San Francisco, California, October 1984.

"Innovative Engineering Completes Dredge Spoil Facility Facility," by Vahan Tanal. Published in *Civil Engineering*, March 1984.

"Dredging the Delaware River: An Assessment of the Disposal Capacity for Dredged Material and Some User-Fee Proposals," by David Atkin. Presented at the Pollution and Water Resources Series of the Columbia University Seminars, New York City, November 1982.

APPENDIX B

KEY PERSONNEL RESUMES

BETSY D. STRIPLIN
President and Senior Scientist

EMPLOYMENT HISTORY

Striplin Environmental Associates
Washington State Department of Natural Resources, Division of Aquatic Lands
Tetra Tech, Inc.
Evans-Hamilton, Inc.

EDUCATION

M.S. Marine Biology, University of Victoria, 1984
B.A. Biology, University of Vermont, 1979

TECHNICAL SPECIALTIES

- Contaminated Sediment Management Planning
- Sediment Quality Assessment
- PSDDA Characterization Surveys
- Benthic Invertebrate Community Assessment

PROFESSIONAL AFFILIATIONS

Estuarine Research Federation
Pacific Estuarine Research Society
Society of Environmental Toxicology and Chemistry

REPRESENTATIVE PROFESSIONAL EXPERIENCE

- Portland Harbor RI/FS. Project Coordinator for the Portland Harbor, OR remedial investigation on behalf of the Lower Willamette PRP Group. Tasks include coordinating the efforts of an RI/FS consultant team and leading the technical elements of the RI. In 2001/2002 led development of the Programmatic Work Plan and provided senior technical oversight to the Round 1 Field Sampling Plan and QAPP. Provided senior oversight for a 3-month field collection program in summer/fall 2002 and a smaller sediment sampling program. Leading negotiations on nature and extent and source identification issues. Overseeing preparation of the Round 2 Field Sampling Plan.

- Lower Duwamish Waterway RI/FS. Technical consultant to City of Seattle, Seattle City Light, during the RI/FS for the Lower Duwamish Waterway CERCLA site. Review technical documents prepared by the PRP Group's technical consultant, attend PRP group meetings and internal strategy meetings. Prepare issue papers.

- Portland Harbor RI/FS Planning. Technical project manager for the Port of Portland (OR) for the Port's early involvement in the Portland Harbor RI/FS. Represented the Port in ODEQ's development of the Portland Harbor Sediment Management Plan (1999) and a draft RI/FS Workplan (2000). Advised the Port on regulatory strategy, liability issues, technical program development, and

identification of data gaps. Directed studies on changes in federal channel bathymetry over time (1990-2000).

- Slip 4 Existing Data Summary. Provided senior technical review of a Slip 4 existing data summary for the City of Seattle, Seattle City Light. This work was a prelude to full RI/FS activities in Slip 4.

- Expert Testimony. Provided expert testimony in Port of Portland v. Union Pacific Railroad lawsuit over sediment contamination in Terminal 4 Slip 3 on the Willamette River. Addressed issues related to causes of sediment toxicity.

- Portland Harbor PRP Search. Technical director for a search of potentially responsible parties in Portland Harbor for the Portland Harbor Group. This search supplemented work being undertaken by Oregon Department of Environmental Quality by focusing on former businesses.

- Portland Harbor Mapping. Project Manager for the development of a series of surface and subsurface maps (generated in ArcView) depicting the distributions of chemical contaminants throughout Portland Harbor.

- Hylebos Waterway Pre-Remedial Design. Project Manager (1993-1998) for the sediment assessment activities to delineate areas of Hylebos Waterway (part of Commencement Bay CERCLA site) that will require active remediation, natural recovery, or no action. Managed preparation of the existing data compilation report, sampling and analysis plans for sediment surface, subsurface, intertidal, and habitat sampling, quality assurance project plans, and the technical memoranda and data reports. Developed data evaluation approach to identify remediation, natural recovery, and no action areas. Represented the Hylebos Cleanup Committee in scope of work negotiations with U.S. EPA as well as in ongoing negotiations regarding data evaluation, delineation of no action, natural recovery and remediation areas, and future sampling and data evaluation needs.

- Portland Shipyard Site Investigation. Providing senior review of an intensive and rapid sediment characterization of sediments in the vicinity of the Portland Shipyard for the Port of Portland. The goals of the characterization are to establish the area impacted by shipyard operations, the volume of sediments that may require remedial actions, and the possible identification of responsible parties over the 60 years of shipyard operations.

- Site Investigations and Remedial Design for Pakonen Boatyard. Provided senior oversight for the site investigation at this boatyard in Grays Harbor, WA. Chemicals of concern include tributyltin, copper, lead and zinc. Conducting evaluation of remedial alternatives for site cleanup. Will monitor remedial action.

- Middle Waterway Remedial Design. Provided technical oversight during scope of work negotiations with EPA Region X on this portion of the Commencement Bay CERCLA site. Prepared portions of the program work plan.

- Sediment Management Planning for Hylebos Waterway. Carried out sediment management planning for potential remediation efforts in Hylebos Waterway, Commencement Bay. Evaluated existing data to assess whether sediments may 1) require remediation, and 2) be suitable for disposal at the PSDDA open-water disposal site in Commencement Bay. Also evaluated sediment quality for potential disposal at a nearshore confined disposal facility.

- Puget Sound Dredged Disposal Analysis (PSDDA). Managed the Puget Sound Dredged Disposal Analysis (PSDDA) program for the Washington Department of Natural Resources (DNR). Reviewed sampling and analysis plans and interpreted resulting chemical and biological data for dredging projects. Administered and provided technical guidance for the first two years of the physical and environmental monitoring programs at PSDDA disposal sites.

- Sediment Characterizations Under the Puget Sound Dredged Disposal Analysis (PSDDA) Program. Managed or provided technical oversight for two sediment characterization projects under the PSDDA program. For the Konoike-Pacific Tacoma Terminals dredging project on Blair Waterway, directly provided all services to obtain federal, state, and local permits including a full characterization sampling program. For the Port of Seattle's Terminal 115 dredging project, provided technical oversight and sampling assistance to ensure that the sampling and analysis plan and data report meet PSDDA requirements.

- Development of Benthic Infaunal Reference Area Sediment Performance Standards. Provided quality assurance oversight to the development of reference area performance standards for the Washington Department of Ecology.

- Sitcum Waterway Water Quality Monitoring. Participated in the field, data management, data analysis, and reporting aspects of the water quality monitoring associated with remedial action activities in Sitcum, Milwaukee, and Blair Waterways. Assisted in preparation of the Sampling and Analysis Plan and the generation of ambient water quality data.

- Initial Data Summaries and Problem Identification. Co-authored the Initial Data Summaries and Problem Identification reports for Sinclair and Dyes Inlets and for Budd Inlet for U.S. EPA. Synthesized sediment chemistry, sediment toxicity, and bioaccumulation data Identified and ranked priority problem areas for further evaluation.

- Commencement Bay Nearshore/Tideflats RI/FS. Managed final preparation of the Commencement Bay Nearshore/Tideflats Feasibility Study for Washington Department of Ecology and U.S. EPA. Prepared initial evaluation of benthic community structure data for the Commencement Bay Nearshore/Tideflats Remedial Investigation for Tetra Tech.

- Jackson Park Housing Complex RI/FS. Conducted the sediment quality and benthic community analyses for the Jackson Park Housing Complex (Dyes Inlet) RI/FS ecological risk assessment. Related biological effects to sediment variables (i.e., sediment grain size, total organic carbon, chemical concentrations). Evaluated chemical and biological data under the Washington State Sediment Management Standards. Compared chemical data to estimated sediment criteria derived using Equilibrium Partitioning.

- PSWQA Quality Assurance/Quality Control Work Group. Represented DNR on the Puget Sound Water Quality Authority Quality Assurance/Quality Control work group called for under the Puget Sound Water Quality Management Plan.

- Puget Sound Marine Sediment Monitoring. Managed analysis of benthic community structure and relationships among sediment chemistry, sediment toxicity, and benthic community structure for the Marine Sediment Monitoring Task of the 1989 Puget Sound Ambient Monitoring Program.

- Skagway Harbor Sediment and Tissue Investigation. Managed field investigation of heavy metal contamination in Skagway Harbor (AK) for U.S. EPA and Alaska Department of Environmental Conservation. Responsibilities included program design; collection of water, sediment, and tissue samples; oversight of chemical laboratories; data analysis and interpretation; and report preparation.

- Long Island Sound Sediment Investigation. Managed Long Island Sound Sediment Quality Survey for the National Oceanic and Atmospheric Administration. Led field, data management, and report preparation efforts. Program involved conductivity-temperature-depth profiling, sediment profile imaging, and sediment analyses at 55 stations.

- Puget Sound Environmental Atlas. Managed preparation of the Puget Sound Environmental Atlas for the U.S. Army Corps of Engineers, U.S. EPA, and Puget sound Water Quality Authority. Mapped and described data on the physical environment, natural resources, human resources, indicators of pollution, and areas of environmental concern.

PUBLICATIONS
(Note that B. Striplin previously published as B. Day)

PAPERS

Striplin, B., D. Kendall, and J. Lunz. 1991. Environmental conditions at two PSDDA open-water disposal sites: do they match the predictions? In: Puget Sound Research '91 Proceedings. Puget Sound Water Quality Authority, Seattle, WA.

Striplin, P., K. Keeley, and B. Striplin. 1991. Puget Sound marine sediment quality, or how dirty is Puget Sound? In: Puget Sound Research '91 Proceedings. Puget Sound Water Quality Authority, Seattle, WA.

Day, B. and K. Gurol. 1987. The Puget Sound Environmental Atlas. Puget Sound Notes, March 1987. Published by the US Environmental Protection Agency and Washington Department of Ecology.

Ebbesmeyer, C.C., B. Day, C.A. Coomes, and J.M. Cox. 1987. Sewage trapping by water parcels in Puget Sound. In: Proceedings of Coastal Zone 1987. American Society of Civil Engineers, Seattle, WA. pp. 3502-3516.

Striplin, P.L., P. Sparks-McConkey, and B. Day. 1987. Identifying depositional areas in Puget Sound. In: Proceedings of Coastal Zone 1987. American Society of Civil Engineers, Seattle, WA. pp. 1848-1861.

Day, B. 1984. The shell as a recording device: growth record and shell ultrastructure of *Lampsilis radiata radiata* (Pelecypoda: Unionidae). Canadian Journal of Zoology. 62:2495-2504.

Day, B. 1983. Distribution and abundance of *Caecum cornucopiae* (Gastropoda: Prosobranchia) on *Cladophora crystallina* mats in a Bahamian saltwater lake. Veliger 26:128-135.

Day, B. 1978. Cannibalism in the salt marsh killifish *Fundulus heteroclitus*. Presented at Marine Biological Laboratory summer meetings. Biological Bulletin 155:433.

TECHNICAL REPORTS

Striplin Environmental Associates and MFG. 2000. Statement of Work, Portland Harbor RI/FS. Prepared for The Portland Harbor Group. Striplin Environmental Associates, Seattle, WA. (Senior author).

Striplin Environmental Associates, Dalton, Olmsted & Fuglevand, and D.M.D. 1999. Hylebos Waterway Pre-Remedial Design, Round 2 Data Report. Prepared for the Hylebos Cleanup Committee. Striplin Environmental Associates, Olympia, WA. (Senior author).

Striplin Environmental Associates, Dalton, Olmsted & Fuglevand, Aura Nova, D.M.D. 1997. Hylebos Waterway Pre-Remedial Design, Round 1 Data Report. Final Report. Prepared for the Hylebos Cleanup Committee. Striplin Environmental Associates, Olympia, WA. (Senior author).

Striplin Environmental Associates, Dalton, Olmsted & Fuglevand, Aura Nova, D.M.D., and R.P. Feins. 1996. Hylebos Waterway Pre-Remedial Design, Event 1A and 1B Data Report. Final Report. Prepared for the Hylebos Cleanup Committee. Striplin Environmental Associates, Olympia, WA. (Senior author).

Striplin Environmental Associates, Dalton, Olmsted & Fuglevand, Aura Nova, and D.M.D. 1996. Event 1C Phase I and Phase II Addendum to Pre-Remedial Design Data Report. Draft Report. Prepared for the Hylebos Cleanup Committee. Striplin Environmental Associates, Olympia, WA. (Contributing author).

Striplin Environmental Associates, Hartman Associates, and M.B. McAuliffe. 1995. Summary of Existing Information for the Commencement Bay Nearshore/Tideflats Superfund Site - Hylebos Waterway Pre-Remedial Design Program. Final Report. Prepared for the Hylebos Cleanup Committee. Striplin Environmental Associates, Olympia, WA. (Senior author).

Striplin Environmental Associates, Science Applications International Corporation, D.M.D., Dalton, Olmsted & Fuglevand, and Converse Consultants. 1994. Combined Sampling and Analysis Plan and Quality Assurance Project Plan for the Commencement Bay Nearshore/Tideflats Superfund Site - Hylebos Waterway Problem Areas. Final Report. Prepared for the Hylebos Cleanup Committee. Striplin Environmental Associates, Olympia, WA. (Senior author).

Striplin, B. 1993. PSDDA sediment characterization at Konoike-Pacific Tacoma Terminals, Inc. on Blair Waterway. Prepared for the PSDDA agencies. Striplin Environmental Associates, Olympia, WA.

Striplin, B. 1992. Hylebos Waterway sediment management planning: estimates of navigation channel and nearshore sediment volumes needing cleanup under the Commencement Bay Record of Decision and meeting PSDDA guidelines for open-water disposal. Prepared for the Port of Tacoma. Striplin Environmental Associates, Olympia, WA.

Striplin, B. 1992. Jackson Park Housing Complex RI/FS sections 7.4.3 and 7.5.3: analysis of benthic infauna communities and associated sediment quality for the offshore operable unit. Draft report. Prepared for URS Consultants, Inc. and the U.S. Navy. Striplin Environmental Associates, Olympia, WA.

Striplin, B. 1991. Technical assistance options for the Cascade Pole public participation grant. Prepared for the Cascade Pole Public Participation Grant Project and the American Littoral Society. Striplin Environmental Associates, Olympia, WA.

Striplin, B. 1991. Standard operating procedures: reconnaissance survey of potentially contaminated sediment in selected areas of Puget Sound. Washington Department of Natural Resources, Olympia, WA.

Striplin, B., G. Braun, and G. Bilyard. 1991. Marine benthic community structure. In: Sediment Classification Methods Compendium. Prepared for the US Environmental Protection Agency, Washington, D.C. Tetra Tech, Inc., Bellevue, WA.

Day, B. 1991. Skagway Harbor field investigation. Prepared for the US Environmental Protection Agency, Seattle, WA and the Alaska Department of Environmental Conservation, Juneau, AK. Tetra Tech, Inc., Bellevue, WA.

Keeley, K., B. Day, G. Pascoe, and R. Farlow. 1990. Puget Sound ambient monitoring program 1989: marine sediment monitoring. Prepared for the Washington Department of Ecology. Tetra Tech, Inc., Bellevue, WA.

Day, B. 1989. Monitoring program for the Seattle Ferry terminal sediment cap. Prepared for the Washington Department of Transportation, Olympia, WA. Tetra Tech, Inc., Bellevue, WA.

Day, B. 1989. Technical review of water quality and biological conditions in the vicinity of the Ketchikan, AK municipal sewage outfall. Prepared for the US Environmental Protection Agency, Seattle, WA. Tetra Tech, Inc., Bellevue, WA.

Day, B., J. Jacoby, and S. Trevathan. 1988. Elliott Bay action program: guidance for development of monitoring programs to evaluate the success of source control within drainage basins. Prepared for the US Environmental Protection Agency, Seattle, WA. Tetra Tech, Inc., Bellevue, WA.

Day, B. 1988. Technical review of water quality and biological conditions in the vicinity of the Skagway (AK) municipal outfall. Prepared for the US Environmental Protection Agency, Seattle, WA. Tetra Tech, Inc., Bellevue, WA.

Day, B. and K. Keeley. 1988. Budd Inlet action plan: initial data summaries and problem identification. Prepared for the US Environmental Protection Agency, Seattle, WA. Tetra Tech, Inc., Bellevue, WA.

Day, B., K. Keeley, S. Brown, V. Fagerness, L. Kilpatrick-Howard. 1988. Sinclair and Dyes Inlets action program: initial data summaries and problem identification. Prepared for the US Environmental Protection Agency, Seattle, WA. Tetra Tech, Inc., Bellevue, WA.

Day, B., R. Farlow, P. Striplin, J. Cox, C. Ebbesmeyer, K. Gurol, C. Coomes, K. Kurrus, and A. Carlson. 1987. Puget Sound Environmental Atlas. Prepared for the US Army Corps of Engineers, US Environmental Protection Agency, and Puget Sound Water Quality Authority, Seattle, WA. Evans-Hamilton, Inc., Seattle, WA.

Day, B., L. Schaffner, R. Diaz, and J. Ryther. 1987. Long Island Sound sediment quality survey and analyses. Prepared for the National Oceanic and Atmospheric Administration, National Ocean Service, Rockville, MD. Evans-Hamilton, Inc., Seattle, WA.

Striplin, P., B. Day, and P. Sparks-McConkey. 1986. Effects of organic enrichment on the benthic infaunal communities under a salmon rearing pen. Prepared for the US Army Corps of Engineers, Seattle, WA and the National Marine Fisheries Service, Manchester, WA. Evans-Hamilton, Inc., Seattle, WA.

Striplin, P., P. Sparks-McConkey, and B. Day. 1986. Puget Sound sediment deposition analysis. Prepared for the US Army Corps of Engineers, Seattle, WA. Evans-Hamilton, Inc., Seattle, WA.

Day, B. and D. Grosse. 1986. Review and annotated bibliography of juvenile lingcod and flatfish populations inhabiting Grays Harbor with reference to potential adverse impacts caused by dredging. Prepared for the US Army Corps of Engineers, Seattle, WA. Evans-Hamilton, Inc., Seattle, WA.

Day, B. 1985. Fort Lewis mobilization master plan and master plan revision. Prepared for the US Army Corps of Engineers, Seattle, WA. Evans-Hamilton, Inc., Seattle, WA.

Striplin, P., B. Day, and J. Word. 1985. Quality assurance/quality control methods manual: sampling, sorting, and identification procedures for benthic ecology. Prepared for Tetra Tech, Inc. Evans-Hamilton, Inc., Seattle, WA.

Striplin, P., B. Day, and J. Word. 1985. Benthic communities and sediment stability in the region of the proposed Duwamish Head outfall, Seattle, WA. Prepared for URS Engineers, Seattle, WA. Evans-Hamilton, Inc., Seattle, WA.

Day, B. 1984. Spatial and temporal variation of the macrobenthos in East Sound, a shallow fjord in the San Juan Islands of Washington. Prepared for the University of Victoria in partial fulfillment of a Master of Science degree. University of Victoria, Victoria, BC.

VICKI L. FAGERNESS
Senior Marine Scientist

EDUCATION

M.S. Biological Oceanography, Oregon State University, 1984
B.A. Biology, Colorado College, 1977

EMPLOYMENT HISTORY

Striplin Environmental Associates (1996 – present)
EcoChem, Inc. (1990 – 1994)
Parametrix, Inc. (1989 – 1990)
Tetra Tech, Inc. (1988 – 1989)
University of Washington, School of Oceanography (1982 – 1988)

PROFESSIONAL AFFILIATIONS/CERTIFICATIONS

Society of Toxicology and Chemistry/Pacific Northwest Chapter
Hazardous Waste Operations and Emergency Response 40-hour Certification
Hazardous Waste Operations Supervisor 8-hour Certification

EXPERTISE AND EXPERIENCE

Ms. Fagerness has over 13 years experience in the environmental field, with emphasis in the collection, analysis and evaluation of sediment and water quality data from marine and estuarine environments. She has experience in contaminated sediment management under CERCLA, Washington State Sediment Management Standards and the Puget Sound Dredged Disposal Program, and has applied this knowledge to projects ranging from sediment characterization for dredging and disposal to sediment remediation at hazardous waste sites. Ms. Fagerness identified and evaluated potential chemical sources and pathways to the marine environment for Slip 4 in the Duwamish River, the Hylebos Waterway pre-remedial design program, the Elliott Bay Action Program, and the Port of Seattle Southwest Harbor Project. Ms. Fagerness' surface water experience includes landfill monitoring, effluent toxicity testing, and environmental impact statements.

Ms. Fagerness' specific project experience within the last 5 years related to work covered by this RFP's Statement of Work and illustrating her suitability for the task manager role is given below:

PROFESSIONAL EXPERIENCE

- U.S. Army Corps of Engineers, Marine Sediment Sampling, Chemical and Biological Analyses in Western Washington. Led or participated in PSDDA sediment characterizations to determine the suitability of materials for open-water disposal. Projects included:
  - *Swinomish Navigation Channel* - Led project, field and lab oversight, report preparation
  - *Grays Harbor Navigation Channel* (FY02) – Led project, field and lab oversight, report preparation
  - *Olympia Harbor and Navigation Channel* - Led project, field and lab coordination, and report preparation.

- U.S. Army Corps of Engineers, Wyckoff/Eagle Harbor Outfall Sediment Monitoring. Coordinated the 2002 sediment sampling program to assess impacts of groundwater treatment plant discharge on marine sediments. Managed preparation of work plan, field sampling plan, quality assurance project

plan and health and safety plan. Coordinated field work and laboratory analysis. Prepared data report comparing chemical and biological testing results to state standards, previous monitoring events and baseline data.

- Commencement Bay PSDDA Disposal Site Monitoring, 2001. Assisted with program to evaluate environmental effects of dredged material disposal. Participated in collection and preparation of surface sediment, benthic infauna, and sea cucumber tissue samples. Coordinated sample shipping and laboratory analysis.

- Lower Willamette Group, Sampling Plan Preparation. Coordinated preparation of the Round 1 Field Sampling Plan for the Lower Willamette River Superfund Site Remedial Investigation. Data were required for site characterization and ecological and human health risk assessments. This extensive sampling program involved multiple consultants and required collection of several hundred sediment, invertebrate, and fish tissue samples for chemical analysis.

- Environmental Impact Statement, Puget Sound Confined Disposal Site Study, WA. Assisted with preparation and coordination of the Programmatic Environmental Impact Statement for initial environmental review and cost analysis of major alternatives for the confined disposal of contaminated sediments dredged from Puget Sound, Washington. The PEIS examined potential environmental impacts of seven disposal alternatives (including aquatic, nearshore and upland options) on both the natural and built environments. Areas of special concern included habitat loss, changes in land use, siting difficulty, sediment rehandling requirements and potential short-term environmental exposure, monitoring needs, and aesthetic impacts.

- PSDDA Sediment Characterization, Bellingham, WA. Conducted full PSDDA characterization of nearshore sediments adjacent to a Port of Bellingham shipping terminal. Responsible for preparing sampling and analysis plan and obtaining agency approval, conducting sediment coring and sample processing, and overseeing chemical laboratory analyses. Interpreted chemical data and prepared final summary report. This data collection effort included obtaining the chemical data required for upland disposal, allowing this option to be pursued without additional field sampling when chemical concentrations proved to be too high for sediment open-water disposal.

- Permitting for Bulkhead Fill Project, Everett, WA. Assisted with environmental permitting for a subtidal fill project at a pulp and paper mill. Primary issues of concern were existing sediment contamination and potential eelgrass habitat. Compiled information on habitat and biological resources in the fill area, evaluated potential impacts, worked with engineers and project planners to develop methods to minimize sediment disturbance during construction , and prepared the JARPA permit application.

- PSDDA Sediment Characterization, Aberdeen, WA. Managed PSDDA characterization of nearshore sediments adjacent to a Port of Grays Harbor shipping terminals. Work included preparing a sampling and analysis plan for agency approval, collecting surface (grab) sediment samples, and overseeing chemical laboratory analyses. Interpreted chemical data and prepared final summary report.

- Biological Evaluation/Biological Assessment, Olympia, WA. Prepared BE/BA in support of 404 permitting for a proposed bulkhead replacement and repair project. The BE/BA evaluated potential impacts to endangered and threatened species, including chinook salmon and bull trout. Forage fish

were of particular concern as the project was located in a designated surf smelt spawning area. Worked with property owner to incorporate measures to improve forage fish habitat.

- Assessment of Watershed Integrity, Seattle, WA. Assisted Seattle Public Utilities in developing an index to assess the health of urban watersheds in Seattle. The index was targeted to the general public and distributed in a baseball card format. Work included formation of a community and scientific advisory committee, public outreach efforts, development of multiple measures and indices of watershed health and volunteer involvement, preparation of standardized data collection and analysis protocols, and final card design.

- PSDDA Sediment Characterization, Tacoma, WA. Conducted PSDDA sediment characterization for dredged sediments adjacent to U.S. Oil and Refining Co. Prepared sampling and analysis plan and obtaining agency approval, coordinated field sampling, and provided oversight and quality assurance for laboratory chemical analyses. Interpreted chemical data and prepared final summary report.

- Slip 4, Duwamish Waterway, Seattle, WA. Provided assistance to Seattle City Light for liability allocation and sediment remediation in an industrial slip in the Duwamish River. Reviewed client and regulatory agency files and compiled existing data and documents to establish baseline information on sediment and water quality, sources of chemical contamination, physical environment, and biological communities in the project area. Evaluated potential liability for chemical contamination based on environmental data and historic practices.

- Marine Outfall Siting Study, King County, WA. Researched and compiled data and information on biological resources at several potential outfall locations along the eastern shoreline of Puget Sound. Emphasis was on the distribution and occurrence of marine mammals, birds, crabs and clams. Information on basic biology, life cycle, and habitat requirements of these species was also included.

- Chemical Source Control Evaluation, Tacoma, WA. Coordinated task to evaluate the potential for recontamination prior to sediment remediation in Hylebos Waterway, under CERCLA. Compiled and evaluated groundwater, soil and surface water data from twelve industrial sites as well as NPDES and municipal stormwater monitoring data for Hylebos Waterway. Compared upland data to applicable criteria and standards. Other types of data analysis included evaluation of chemical spatial distributions, temporal changes in chemical concentrations, and chemical fingerprinting. Identified and prioritized potential chemical sources requiring additional investigation or control.

- Hylebos Waterway Sediment Investigation, Tacoma, WA. Prepared sampling and analysis plan and coordinated field-sampling effort for Phase 3 of the Hylebos Waterway Pre-Remedial Design program. This effort included collection of subtidal and intertidal sediments at 30 stations for chemical analysis, biological toxicity testing and benthic infauna abundance analysis. Coordinated laboratory analysis and data quality assurance review, and authored technical memorandum documenting the sampling and analysis program and presenting laboratory results.

- Natural Resources Damage Assessment, Kitsap County, WA. Managed project to evaluate PCB contamination in intertidal and marine sediments at a CERCLA site and to identify potential biological effects. Responsible for sampling plan design, field sampling, subconsultant oversight, data evaluation and final report.

- NPDES Baseline Sediment Investigation, Everett, WA. Compiled and reviewed existing sediment chemistry and biological data and evaluated marine sediment quality in the vicinity of three pulp and paper mill wastewater outfalls. Developed a baseline sediment study plan to collect additional chemical and biological data and provide a basis for future monitoring investigations.

- Priority Habitats and Species Survey, Ilwaco, WA. Responsible for marine component of Priority Habitats and Species Survey prepared in support of permit requirements for waterfront expansion at a U.S. Coast Guard Station. Conducted reconnaissance level survey of marine habitat and biological communities in intertidal and shallow subtidal areas to evaluate the possible presence of priority habitats, threatened or endangered species, or other protected or monitored species. Evaluated potential impacts of dock expansion on existing communities and recommended mitigation measures.

- Denny Way/Lake Union CSO Control Project, Seattle, WA. Managed task order contract to assist with a variety of assignments related to marine sediments and outfall construction impacts on the marine environment. Tasks completed to date include drafting the sediment characterization sampling analysis plan, compiling data, and preparing a technical memorandum summarizing existing information on sediment quality, biological communities, and sensitive areas in Elliott Bay that could not be affected by the proposed outfalls.

- South Lake Union Park Environmental Impact Statement, Seattle, WA. Evaluated potential impacts of park development for the Seattle Department of Parks and Recreation. The effects of three different park development alternatives on water quality, sediments and biota in an urban lake in Seattle, Washington were identified and compared to select a recommended alternative. This evaluation complied with NEPA/SEPA requirements.

- Pope and Talbot/Port of St. Helens Sediment Characterization, St. Helens, OR. Assisted with intertidal sediment sampling at the site of a former wood treatment facility located adjacent to Multnomah Channel of the Columbia River. Both discrete and composite sediment samples were collected using hand-corers for analysis of chemistry and biological toxicity.

- Confined Disposal of Contaminated Sediments, WA. Coordinated report for the Washington State Department of Ecology to develop standards for confined disposal of contaminated sediments in aquatic, nearshore, and upland environments (Element S-4 of the Puget Sound Water Quality Management Plan). Multiple authors with expertise in the areas of hydrogeology, engineering design, sediment remediation, and hydrology contributed to the report. The evaluation of alternatives and standards development was overseen by a committee comprised of representatives from numerous regulatory agencies and interested parties. In addition to report coordination, evaluated two existing upland landfills for effectiveness in containing dredged sediment.

REPRESENTATIVE PUBLICATIONS

Striplin Environmental Associates, Inc. 2002. PSDDA Sediment Characterization Report, Grays Harbor Navigation Channel, Grays Harbor, Washington. Prepared for the U.S. Army Corps of Engineers, Seattle District.

Striplin Environmental Associates, Windward Environmental, Anchor Environmental and Kennedy/Jenks Consultants. 2002. Round 1 Field Sampling Plan, Portland Harbor RI/FS. Prepared for Lower Willamette Group, Portland, OR.

Striplin Environmental Associates, Battelle Marine Science Laboratory, and King County Department of Natural Resources. King County Marine Habitat Report, Prepared in support of the Wastewater Treatment Division, Habitat Conservation Plan and the Brightwater Marine Outfall Siting Study. Prepared for King County Department of Natural Resources, Seattle, WA.

Striplin Environmental Associates, Inc. 2002. Slip 4 Data Analysis and Preliminary Allocation Summary. Prepared for Seattle City Light, Seattle, WA.

Striplin Environmental Associates, Inc. 2001. Data Report. Sediment Characterization For Port of Grays Harbor. Prepared for Port of Grays Harbor, Aberdeen, WA.

Striplin Environmental Associates, Inc. 2001. Lower Duwamish Slip 4 Summary of Existing Information. Prepared for Seattle City Light, City of Seattle, WA.

Striplin Environmental Associates, Inc. 2000. Slip 4 Existing Information File Review. Technical Memorandum. Prepared for Seattle City Light, City of Seattle, WA.

Striplin Environmental Associates, Inc. 2000. Biological Evaluation/Biological Assessment: Bulkhead Repair Permit Application. Prepared for S. Henderson, Olympia, WA.

Striplin Environmental Associates, Inc. 1999. Puget Sound Confined Disposal Site Study Programmatic Environmental Impact Statement. Prepared for U.S. Army Corps of Engineers, Seattle District; Washington Department of Ecology, and Washington Department of Natural Resources.

Striplin Environmental Associates, Inc. 1999. Bioaccumulation Data Report, PSDDA Sediment Characterization Report, Olympia Harbor. Prepared for the U.S. Army Corps of Engineers, Seattle District.

Striplin Environmental Associates, Inc. 1999. Sampling and Analysis Plan Addendum for Bioaccumulation Testing, PSDDA Sediment Characterization Report, Olympia Harbor. Prepared for the U.S. Army Corps of Engineers, Seattle District.

Striplin Environmental Associates, Inc. 1999. PSDDA Sediment Characterization Report, Olympia Harbor, Olympia, Washington. Prepared for the U.S. Army Corps of Engineers, Seattle District.

Striplin Environmental Associates, Inc. 1999. Sampling and Analysis Plan for PSDDA Sediment Characterization, Olympia Harbor, Olympia, Washington. Prepared for the U.S. Army Corps of Engineers, Seattle District.

Striplin Environmental Associates, Inc. 1998. Whatcom Waterway PSDDA Sediment Characterization, Bellingham, Washington. Prepared for the Port of Bellingham.

Striplin Environmental Associates, Inc. 1998. U.S. Oil PSDDA Sediment Characterization, Blair Waterway, Tacoma, WA. Prepared for the U.S. Oil, Tacoma, WA.

Striplin Environmental Associates, Inc. 1997. Hylebos Waterway Pre-Remedial Design Program. Event 1C Phase III Technical Memorandum. Prepared for the Hylebos Cleanup Committee.

Resumé

Gary A. Pascoe, Ph.D., DABT

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Port Townsend, WA 98368
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ACADEMIC TRAINING

Ph.D., Comparative Pharmacology and Toxicology, 1983. University of California, San Francisco. Dissertation title: *Intestinal Cytochrome P-450. Regulation by Gastrointestinal Hormones, and Dietary Nutrients and Xenobiotics*.

B.A., Biology, 1975. University of California, San Diego.

Biology, 1970-1974. San Diego State University.

PROFESSIONAL CERTIFICATIONS

Diplomate, American Board of Toxicology (DABT), 1988; renewed 1994.

Registered Environmental Assessor (REA-04198), California EPA, 1992.

CURRENT AND PREVIOUS POSITIONS

Independent Consultant, 1999 – present. Pascoe Environmental Consulting, Port Townsend, WA. Consulting in toxicology, ecological and human health risk assessment, sediment evaluations, and regulatory compliance.

Senior Scientist/Program Manager, 1995 - 2002. EA Engineering, Science, and Technology, Inc., Bellevue, WA. Consulting in sediment evaluations, ecological and human health risk assessment, regulatory compliance, and toxicology. Manager of RI/FS and risk assessment projects**.**

Consulting Scientist, 1997-1999. Natural Resources Consultants Inc., Seattle, WA. Consulting services in ecological risk assessment and marine aquatic toxicology**.**

Vice President, Technical Affairs, 1993 - 1995; **Technical Director**, 1991 - 1993; **Senior Toxicologist**, 1989 - 1990. Environmental Toxicology International, Inc., Seattle, WA. Specialists in risk assessments and toxicology. Roles included guidance on technical direction of the company, management of government sector programs and large technical projects, staff training in technical and managerial skills, technical staff performance evaluations, client consultations, proposal management, assistance in finances and marketing.

Toxicologist, 1988-1989. Tetra Tech, Inc., Bellevue, WA. Project/task management for private and government clients in risk assessment, regulatory compliance, and toxicology evaluations.

Research Associate, 1986-1987. Department of Medicinal Chemistry, University of Washington, Seattle, WA. GC and LC/MS analyses of reactive metabolites and protein-bound contaminant residues; effects of antioxidants on xenobiotic metabolism and protein binding.

Research Associate, 1983-1986. Environmental Health Sciences Center., Oregon State University, Corvallis, OR. Development of hepatocyte models of chemical toxicity and oxidative stress; interactions of cellular redox systems with endogenous antioxidants during chemical insult.

Teaching Assistant, 1979-1982. Department of Pharmacology, U.C. San Francisco.

Research Assistant, 1978-79. Department of Pharmacology, U.C. San Francisco. Management of data collection for toxic effects code for the *Registry of Toxic Effects of Chemical Substances*.

Teaching Assistant, 1976. Department of Biology, San Diego State University.

PROFESSIONAL EXPERIENCE IN MARINE SCIENCES

LITIGATION SUPPORT/EXPERT WITNESS

- Technical assistance and review of marine fish and benthic invertebrate toxicity studies, and sediment natural recovery analyses, for the Commencement Bay Natural Resource Damage Assessment.
- Provided expert witness testimony to the mining industry on the potential for heavy metals in soil runoff to adversely affect marine biota. Evaluated factors in estuarine surface waters and sediments that govern the bioavailability of metals.
- Litigation support on risks to the marine environment from paper mill discharges of dioxins and metals. Co-design of sampling program for soils, surface water and sediments of lakes and marine waters, and evaluation of program results.
- Technical review of a NEPA permit application to build a trans-mountain pipeline for refined petroleum products. Compared potential ecological impacts with the risks of alternative ocean and river barging.

Ecological Assessments

- Manager of a Remedial Investigation/Feasibility Study for mercury and ordnance-contaminated sediments of a Navy site in Puget Sound. Sediment bioassays,

sedimentology, sediment transport, and source identification. Integrated Washington Sediment Management Standards and CERCLA requirements as part of the ecological risk assessment and evaluation of remedial alternatives. Prepared Proposed Plan and Record of Decision.

- Performed an ecological risk assessment under Oregon DEQ guidelines for PAH- and mercury-contaminated sediments in an estuarine bay near the mouth of the Columbia River. Assessment based on benthic bioassays, direct contact and diet for pelagic and demersal fish, and food chain modeling for aquatic mammals and birds.
- Provided technical reviews of ecological risk assessment documents on the estuarine habitat of the lower Duwamish River Superfund site for the City of Seattle.
- Performed a screening-level ecological risk assessment at an oil refinery near Port Arthur, along the Texas Gulf Coast, based on comparisons of chemical concentrations with appropriate criteria.
- Manager and senior author of a feasibility study and proposed plan for two petroleum and chlorinated solvent-contaminated sites at the Naval Arctic Research Laboratory, Barrow, AK.
- Senior technical review and co-manager of an ecological risk assessment at the Naval Arctic Research Laboratory in Barrow, AK. New methodologies were described in a technical approach paper and work plan. Risk-based screening levels for TPH fractions were developed for protection of terrestrial and aquatic ecological receptors in freshwater and estuarine waters in the arctic.
- Produced a white paper review and evaluation of marine sediment studies at a Navy site in Puget Sound. Recommendations to finalize the remedial investigation and feasibility study.
- Manager of post-ROD monitoring program of a marine shoreline and sediment unit at the Keyport Undersea Warfare Division, for the U.S. Navy. Seasonal measurements of groundwater, seeps, sediments, and tissue residue analyses; sediment bioassays.
- Evaluated remedial options to contain contaminated sediments during construction of an aquarium at an estuarine National Park Service site in Charleston, SC.
- Manager and designer of a risk-based model for developing remedial goals for PCBs and TPH in soil, for a Port of Seattle redevelopment project. Focus on protection of marine organisms exposed to groundwater discharges from multiple industrial properties; site-specific attenuation/dilution parameters and chemical partitioning.
- Evaluated sediment toxicity results for the Puget Sound Sediment Monitoring Program, Washington Department of Ecology. Reference area comparisons; covariance analyses with benthos and chemistry.
- Managed an assessment of marine ecological risks due to DDT, PCBs, and heavy metal contamination in sediments and biota of the Southern California Bight.

Evaluated effects of major storms and outfall discharges on DDT dynamics in marine sediments and fish tissues. Generated an empirical model of DDT bioaccumulation in demersal fish from contaminated sediments.

- Technical assistance for a sampling plan for sediments, surface waters, and biota of nearshore marine waters in Southeast Alaska contaminated with dioxins and pulp mill effluent chemicals.
- Performed technical evaluations of 12 applications to alter National Pollution Discharge Elimination System (NPDES) permits under the Clean Water Act Section 301(h); focus on toxicity tests, bioaccumulation of organic compounds, and fish histopathology.
- Managed an ecological risk assessment of an abandoned industrial property for the Washington National Guard. Complied with Washington Model Toxics Control Act for a future recreational area. Terrestrial and marine habitats were evaluated for risks from PCBs and metals.
- Managed an evaluation of the potential for over 120 modern pesticides to pollute Puget Sound waters, sediments, and biota. Conducted usage surveys and fate and toxicity data analyses. Designed a level-of-concern approach to prioritize pesticides for future sampling by U.S. EPA.

HUMAN HEALTH STUDIES

- Provided technical reviews of human health risk assessment documents on the estuarine habitat of the lower Duwamish River Superfund site for the City of Seattle.

- Managed the collection of fish from an estuarine lagoon in the North Slope of Alaska, and analyses for petroleum chemicals & TPH for use in assessing risks to Inupiat subsistence fish consumers, for the US Navy.
- Designed a fish sampling program and derivation of site-specific bioaccumulation factor for mercury in a southeastern coastal swamp adjacent to a cement plant burning hazardous waste.
- Senior technical review and co-manager of a human health risk assessment at the Naval Arctic Research Laboratory in Barrow, AK. Risk-based screening levels for TPH fractions and petroleum-related and dry cleaning chemicals were developed for protection of subsistence fishers and hunters at Pt. Barrow.
- Managed and designed an approach for generating risk-based chemical concentrations for managing stored sediments during dewatering at the Port of Oakland. The approach developed a matrix model to regulate exposures due to

inhalation and direct contact by workers at the marine terminal and nearby residents.

- Managed a human health risk assessment of an abandoned industrial property along the Puget Sound shoreline, contaminated with PCBs and metals, for the Washington National Guard.
- Technical reviewer of a guidance document for assessing risks from consumption of contaminated seafood; for U.S. EPA Region 10.

Advisory Committees

Science Advisory Board, Ecological Risk Assessment , Washington Department of Ecology, 1996-2000.

Pesticide Incident, Reporting, and Tracking (PIRT) Panel, Washington Department of Health; appointment by Governor, 1990-1998.

PUBLICATIONS

Pascoe, G.A., P. McLaren, and M. Soldate. **2002.** Impact of offsite sediment transport and toxicity on remediation of a contaminated estuarine bay. *Marine Pollution Bulletin* 44:1184-1193.

Pascoe, G.A., and R. Connelly. **2002.** Site-specific bioaccumulation factors for mercury: Impact on health risks from fish consumption. *Proceedings of the Air & Waste Management Association, Specialty Conference on Hazardous Waste Combustion*, April 17, St. Louis, MO.

Pascoe, G.A., M.J. Riley, T.A. Floyd, and C.L. Gould **1998.** Use of a risk-based hydrogeologic model to set remedial goals for PCBs, PAHs, and TPH in soils during redevelopment of an industrial site. *Environmental Science and Technology* 32:813-820.

Pascoe, G.A. **1994.** Role of an ecological risk assessment in reducing uncertainties and remedial costs at a hazardous waste site. In: *Proceedings of the Cost Efficient Acquisition and Utilization of Data in the Management of Hazardous Waste Sites.* Air and Waste Management Association/Waste Policy Institute, Washington, D.C., pp. 242-251.

Pascoe, G.A. **1993.** Wetlands risk assessment. *Environmental Toxicology and Chemistry* 12:2293-2307 (Annual Review).

JERALD D. RAMSDEN, Ph.D., P.E.

Project Manager
Lead Coastal Engineer

Years of Experience
11 (2 with PB; 9 with others)

Education
Ph.D., Civil Engineering, California Institute of Technology, 1993 (emphasis on coastal engineering);
M.S., Ocean Engineering, Oregon State University, 1987;
B.S., Civil Engineering, Oregon State University, 1985

Professional Affiliations
American Society of Civil Engineers

Professional Registrations
Oregon, 1996 (18786PE); Washington, 1999 (35782)

Key Qualifications
Jerald Ramsden specializes in coastal engineering and open channel flow. As a consultant, he assists public and private clients in planning and engineering for waterway facility siting, including bankline and channel stabilization, dredging and disposal alternatives development, design and permitting, dilution studies, wave and current loads on structures, and application of mathematical models to analyze coastal, estuarine, and riverine processes. He has performed a wide variety of hydraulic analyses and/or permitting to support facility siting of deep draft terminals, recreational marinas, shoreline redevelopment and enhancement, and repair or maintenance of existing facilities. His clients have included municipalities, regional and national governments, associations, port authorities, other engineering consultants, law firms, and private industry.

Jerald has assisted clients in numerous projects involving proposed fill or structures placed within the floodway and floodplain. He has provided both hydraulic engineering and permitting expertise on these projects, including local shorelines, state, and federal regulatory requirements. He routinely serves as his client's authorized permitting representative and assists clients in negotiations and coordination with the various resource and regulatory agencies. He has provided technical information to meet Federal Emergency Management Agency (FEMA) guidelines for documentation of floodrise effects associated with several types of in-water developments, including deep draft terminals, bankline development (including fill or other structures), and bankline repairs or enhancements.

Jerald has also developed and refined computer programs for the analysis of extreme winds, wind wave generation, and wave loads on pile supported floating structures. He performs computer analyses for floodrise determinations; steady and unsteady river flows; wind and vessel wake generation; wave transformations across complex bathymetry, including refraction, diffraction, shoaling, and wave energy dissipation; wave and current loads on a variety of structures; digital terrain modeling; and dredge prism development and design. His work has included the design and oversight of field studies to monitor river currents and vessel-generated waves.

Previous Experience
Prior to joining Parsons Brinckerhoff (PB), Jerald served as a coastal engineer with a consulting engineer firm and managed numerous projects in the areas of dredging and disposal, sediment remediation, coastal engineering, open channel hydraulics, numerical modeling, field studies, and permitting. His clients included municipalities, associations, port authorities, regional and national governments, consultants, and law firms.

Dredging, Disposal, and Sediment Remediation
- Wood debris and contaminated sediment dredging as well as sediment capping, including planning, remediation alternatives development and evaluation, design, construction plans, specifications, construction management support and as-built drawings in Upper Hylebos Waterway Turning Basin, Tacoma, Washington

- Hydraulic analyses for a proposed sediment cap, including analyses of winds, wind waves, vessel wake, wave transformations over complex site bathymetry and sediment stability, McCormick and Baxter Superfund Site, Willamette River, Portland, Oregon
- Carrier berth dredging plans and disposal options for clean and contaminated sediment dredging in four ship berths, two turning basins, and one entrance channel, Puget Sound Naval Shipyard, Bremerton, Washington
- Analysis of sedimentation patterns and assisted in development of new work dredging plan configuration for a proposed intermodal facility at the Port of Anchorage, Anchorage, Alaska
- Dredging and material handling plan for removal of depositional sediment in Capitol Lake, Olympia, Washington
- Concept plans for upland, nearshore, and aquatic dredged material disposal sites, Puget Sound, Washington
- Input on dredging and disposal planning and design as well as review of technical specifications and plans for contaminated sediment remediation at a former shipyard, Coos Bay, Oregon
- Dredging and disposal as well as capping alternatives development and evaluation for sediment remediation in Buffalo Slough as part of Columbia Slough restoration, Portland, Oregon
- Dredge plan, mitigation plan, permitting and Endangered Species Act consultation for maintenance dredging at four facilities within an industrial complex on the Columbia River, Vancouver, WA
- Dredging plans and technical specifications for a proposed marina on Tomahawk Island, Columbia River, Portland, Oregon
- Dredging plans, sediment characterization, and permitting for dredging to maintain industrial water intake at a steel mill, Willamette River, Portland, Oregon
- Dredge plan and permitting to deepen a federally authorized access channel, Columbia River, Longview, Washington

Coastal Engineering

- Analysis of wind waves and nearshore wave transformation effects for design of new bankline protection revetment, Barbour's Cut, Port of Houston, Texas
- Quality control review of coastal engineering analysis and breakwater design for a new one-mile long perimeter berm that will serve as a dredged material confinement facility for expansion at the Port of Brisbane, Australia
- Analysis of wave action and design wave pressure distribution on a proposed bulkhead, including ocean swell, tsunamis, hurricane surge, and wind waves, Pearl Harbor, Hawaii
- Value engineering analysis for the North Jetty Repair Project, Yaquina Bay, Newport, Oregon
- Analysis of tides and wind waves, planning and conceptual design of two ferry berth terminals, including jetties, Cold Bay, Alaska
- Analysis of wind waves for sedimentation and maintenance dredge planning for the Port Orford dock, Port Orford, Oregon
- Analysis of ocean wave conditions, nearshore wave transformation effects and cape class vessel response for a deep-draft bulk offload facility feasibility study, Baja California, Mexico
- Feasibility study for barge unloading facility including winds, wind waves, and wave transformation through complex bathymetry; generated wave statistics for operational conditions and design events, coastal location, Southeast Alaska
- Analysis of wind wave generation, nearshore wave transformation and wave conditions within a proposed homeport berth for a U.S. Coast Guard Patrol Boat, Tongue Point, Columbia River Estuary, Astoria, Oregon

- Numerical water wave refraction analysis for the Goleta Point Outfall, Santa Barbara, California
- Physical model study of breakwater overtopping, Buffalo, New York
- Breakwater rehabilitation study, including analyses of wind waves, wave forces, and combined refraction, diffraction, and shoaling of water waves, East Boat Basin, Columbia River, Astoria, Oregon
- Hydraulic analyses for a proposed boat launch, including wind waves, ship waves, combined refraction, diffraction, and shoaling of water waves, sedimentation, flood-induced currents, and hydraulic loads on a soldier pile breakwater, Columbia River, Cowlitz County, Washington
- Wave force analysis for dock failure litigation, Rose City Yacht Club, Columbia River, Portland, Oregon
- Analysis of wind waves, flood currents, water levels, and hydraulic loads on a dock for piling design, Portland Yacht Club, Columbia River, Portland, Oregon
- Analysis of ship wake, wind waves, water levels, and flood currents to determine wave transmission and hydraulic loads on floating wave attenuators and sheet pile walls for a proposed boat launch, Columbia River, Rainier, Oregon
- Analysis of winds, wind waves (including numerical analysis of refraction, diffraction, and shoaling), flood stages, and currents for use in design of bankline stabilization at The Shire, Columbia River, Skamania County, Washington

Waterway Engineering and Permitting

- Scour analysis and review of hydraulics, wave and ice conditions for feasibility of a new bridge over the Knik Arm of Prince William Sound, Anchorage, Alaska
- Dilution study for a new proposed outfall serving up to four industrial users at Port Westward on the Columbia River, Clatskanie, Oregon
- Detroit-Windsor automobile tunnel armor cover inspection including planning and monitoring of dive crew activities at the site, assessment of hydrographic survey results and reporting on condition of the tunnel cover, Detroit River, Detroit, Michigan
- Dilution study for a thermal outfall in the lower Columbia River to support a National Pollution Discharge Elimination System (NPDES) permit renewal, Portland General Electric, Beaver Generating Plant, Clatskanie, Oregon
- River operations modeling using the numerical model HEC5 for Federal Energy Regulatory Commission (FERC) relicensing of five hydropower reservoirs, Clackamas River, Oregon
- Dilution study for NPDES permit extension, Portland General Electric, Trojan Nuclear Power Plant, Rainier, Oregon
- River bankline failure mechanisms, including wind wave and boat wave erosion and stage-discharge relationships, Red River, Winnipeg, Manitoba
- Floodway encroachment analyses, Oregon Steel Mills, Willamette River, Portland, Oregon, and Salem Waterfront, Salem, Oregon
- Hydraulic analysis of potential floodway impacts, assessment of surface water hydrology, and a field study to document the wake caused by a barge permanently moored in a river for the West Hayden Island Development Environmental Impact Statement, Port of Portland, Portland, Oregon
- Hydraulic analyses for bankline repair, floodway impact due to revetment construction, and a spillway for flood flow management, North Santiam River, Stayton, Oregon
- Independent technical review of hydraulic design for four fishing treaty access sites on the Columbia River between White Salmon, Washington and Arlington, Oregon

- City of Rainier Marina master plan development, conceptual design, and cost estimates, Columbia River, Rainier, Oregon
- River bankline repair permitting on the Columbia River at Lieser Point and Columbia Shores in Vancouver, Washington, and the Jantzen Beach Hotel, Portland, Oregon
- Hydraulics and permitting for brownfields waterfront redevelopment and bankline enhancement, North Macadam District, Willamette River, Portland, Oregon
- Design and permitting for bankline repair at International Terminals, Willamette River, Portland, Oregon
- Ship wave inundation study, Columbia River, Austin Point, Woodland, Washington
- Hydraulic analyses for shoreline redevelopment and bankline enhancement, North Macadam District, Willamette River, Portland, Oregon

Teaching Experience

From 1993-1995, Jerald held the position of assistant professor of civil engineering at Clemson University, in South Carolina, where he taught upper division courses. These included a course in numerical analysis, a senior-level design course in hydraulics and hydrology, and a graduate course in open-channel flow. In addition to his teaching responsibilities, Jerald also advised graduate students and conducted sponsored research in the area of coastal engineering and water quality modeling.

Publications/Presentations

- "Hydraulic analyses and design of a sediment cap at a Superfund Site," Abstract accepted, to be presented at the Coastal Structures 2003 conference in Portland, OR, August, 2003.
- "Hydraulic Analyses for Design of a Sediment Cap at a Superfund Site," presented at the 25th Annual Meeting of the Pacific Estuarine Research Society, Portland, Oregon, May 2-4, 2002.
- "Estimation of Breakwater Sheltering using the Refraction-Diffraction Wave Transformation Model REF/DIF I," presented at the 11th Annual Meeting of the States Organization for Boating Access, National Conference, September, 28 through Oct. 1, 1997, Portland, Oregon,
- "Forces on a Vertical Wall Due to Long Waves, Bores, and Dry-Bed Surges," published in *Journal of Waterway, Port, Coastal, and Ocean Engineering*, American Society of Civil Engineers, Vol. 122, No. 3, May/June 1996.
- Coauthor, "Harbor Wave Conditions Due to Breakwater Overtopping," published in *Proceedings Coastal Engineering Practice*, American Society of Civil Engineers, Long Beach, California, 1992.
- "Forces on a Vertical Wall Caused by Incident Bores," published in *Journal of Waterway, Port, Coastal, and Ocean Engineering*, American Society of Civil Engineers, Vol. 116, No. 5, September/October 1990.
- Coauthor, "Bottom Pressures Due to Long Waves: Laboratory and Field Measurements," published in *Proceedings 22nd International Conference on Coastal Engineering*, 1990.
- "Kinematics and Return Flow in a Closed Wave Flume," published in *Proceedings 21st International Conference on Coastal Engineering*, 1989.

Jerald has served as a reviewer for the American Society of Civil Engineers publications of *Journal of Waterway, Port, Coastal and Ocean Engineering, Journal of Hydraulic Engineering*, and for the *Journal of Environmental Engineering*, and has assisted the National Science Foundation in reviewing research proposals regarding coastal engineering and tsunami effects.